ABSTRACT

A fuel battery system comprising a fuel reformer has a disadvantage in that the starting performance is poor because the reformer and the fuel battery require a waiting time for temperature raise. In addition, although an efficiency of the reforming reaction of fuel accompanying heat generation is high as the temperature becomes high, the conventional reformer has been difficult to improve the reforming efficiency by increasing the temperature in the reformer above a self-ignition temperature of the fuel due to the structure of the reformer.

A reformer engine 92 is a reformer having pistons for performing compression work and at the same time an internal combustion engine for generating power, and comprises a plurality of reaction chambers. The fuel battery 93 generates energy using a reaction product from the reformer engine 92. Since there are plurality of heat sources and un-reacted fuel components in the fuel battery system comprising the reformer engine 92, the fuel battery system is intended to improve the efficiency using these heat sources and un-reacted fuel components.

The heat sources and un-reacted fuel components are used for heating a raw material to be supplied to the reformer engine 92 to raise the temperature inside the reaction chamber of the reformer engine 92 above the self-

ignition temperature of the raw material under atmosphere of the reaction chamber. A partial oxidation reaction capable of generating both of mechanical power and hydrogen is caused. The generated mechanical power is used in the other reaction chamber for an endothermic reaction of steam reforming reaction which can produce a large amount of hydrogen.

By controlling heat balance of the system, the reforming efficiency can be improved compared to that of the conventional reformer.